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09/933,946	08/22/2001	Masahiko Takeuchi	1752-0145P	7497

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EXAMINER

HAMILTON, CYNTHIA

ART UNIT	PAPER NUMBER
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1752

DATE MAILED: 07/08/2003

6

Please find below and/or attached an Office communication concerning this application or proceeding.

AS-6

Office Action Summary

Application No.

09/933,946

Applicant(s)

TAKEUCHI ET AL.

Examiner

Cynthia Hamilton

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 November 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 5.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

or (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1-5 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 1-5 require the photo- or heat-curable resin composition be comprised of 0.1-5 parts by weight of an inorganic filler with its average particle diameter controlled in the range 5nm-0.5 um per 100 parts by weight of the resin-forming component.

a. Applicants never define how the average particle diameter is controlled to the range. The examiner is unsure what is meant by "controlled" here. Is this the range the average particle diameter falls within or is there some specific manner in which the diameter is "controlled"? The terminology is vague in view of the specification and unusual. Also, what is meant by "the resin-forming component" is unclear. Is it required to be present? The examiner assumes so since the filler is measured with respect to 100 parts of it.

b. With respect to the resin-forming component, applicants restrict this term by definition on page 14, the first sentence.

*"The resin-forming component of a photo- or heat-curable resin composition of this invention consists of the component (A), the component (B), a*

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*curing agent and other resin or monomer and the resin-forming component comprises at least one kind of them, preferably the component (A) and another kind, more preferably the component (A), the component (B), and other resin or monomer composed essentially of a trifunctional or higher resin or monomer."*

Words of the claim are generally given their ordinary and customary meaning, unless it appears from the written description that they were used differently by the applicant. Where an applicant chooses to be his or her own lexicographer and defines terms with special meanings, he or she must set out the special definition explicitly and with "reasonable clarity, deliberateness, and precision?" in the disclosure to give one of ordinary skill in the art notice of the change. See *Teleflex Inc. v. Gicosa North America Corp.*, 299 F.3d 1313, 1325, 63 USPQ2d 1374, 1381 (Fed. Cir. 2002), *Rexnord Crop. v. Laitram Corp.*, 274 F.3d 1336, 1342, 60 USPQ2d 1851, 1854, (Fed. Cir. 2001) and MPEP 2111.01. Pursuant to 35 USC 112 2nd paragraph, "[i]t is applicant's burden to precisely define the invention, and not the [examiner's]." *In re Morris*, 127 F.3d 1048, 1056, 44 USPQ2d 1023, 1029 (Fed. Cir. 1997). This definition explicitly set forth by applicants is confusing. In claim terminology, "consists", and "comprises" have very precise meanings. See MPEP 2111.03 Transitional Phrases. The transitional phrases "comprising", "consisting essentially of" and "consisting of" define the scope of a claim with respect to what unrecited additional components or steps, if any, are excluded from the scope of the claim. The transitional term "comprising", which is synonymous with "including," "containing," or "characterized by," is inclusive or open-ended and does not exclude additional, unrecited elements or method steps. The transitional phrase "consisting of" excludes any element, step, or ingredient not specified in the claim. *In re Gray*, 53 F.2d 520, 11 USPQ 255 (CCPA 1931); *Ex*

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parte Davis, 80 USPQ 448, 450 (Bd. App. 1948). The transitional phrase "consisting essentially of" limits the scope of a claim to the specified materials or steps "and those that do not materially affect the basic and novel characteristic(s)" of the claimed invention. In re Herz, 537 F.2d 549, 551-52, 190 USPQ 461, 463 (CCPA 1976), PPG Industries v. Guardian Industries, 156 F.3d 1351, 1354, 48 USPQ2d 1351, 1353-54 (Fed. Cir. 1998). See also Atlas Powder v. E.I. duPont de Nemours & Co., 750 F.2d 1569, 224 USPQ 409 (Fed. Cir. 1984); In re Janakirama-Rao, 317 F.2d 951, 137 USPQ 893 (CCPA 1963); Water Technologies Corp. vs. Calco, Ltd., 850 F.2d 660, 7 USPQ2d 1097 (Fed. Cir. 1988). Applicants have in defining the resin-forming component used "consists" which excludes all other components other than those listed on page 14. The use of "comprising" after "consisting" is confusing since this appears to open the closed language in some manner. Further, what "them" is referenced in "*at least one kind of them*" is unclear. Is them the other resin or monomer? What preference is *preferably the component (A) and another kind, more preferably the component (A), the component (B), and other resin or monomer composed essentially of a trifunctional or higher resin or monomer*? To what does "another kind" reference? Is the preference that (A), (B), another resin or monomer all be trifunctional or higher? Is this the preference? Does claim 1 require that the resin forming component as defined on page 14 be present? The examiner believes the claim language reads this way, so she reads component (A), component (B), a curing agent and other resin or monomer are all present in the composition of claim 1 for examination purposes. However, because of the confusion of the limits when considering the claims and specification, rejections on compositions with filler and any resin component in a heat and/or photo curable composition are included. Components (A) and (B) are defined on pages 4-5. Because component (B), i.e. a

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compound containing an epoxy compound is required present in claim 1, the possible absence of it in claim 2 leads to the following objection. If this definition of "resin-forming component" is not intended, then what is the definition? Thus, claims 1-5 are confusing.

6. Claim 2 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Because component (B), i.e. a compound containing an epoxy compound is required present in claim 1, the composition as set forth in claim 2 includes compositions outside the range of claim 1 and as such claim 2 is improperly dependent upon claim 1. See above for an explanation why component (B) is required present in the composition of claim 1.

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Jones et al (6,066,889) as evidenced by Nakagawa et al (5,260,064) and Yoerger et al (5,709,975) and Barito et al (5,084,320), The American heritage Dictionary, second edition, Kirk-Othmer Encyclopedia of Chemical Technology, "What You Need to Know About", The American Heritage Dictionary of the English language: Fourth Edition, Hawkins et al (EP 0 933 681 A1), and Ors et al (4,511,757) . In Example 1 of Jones et al a photoimageable composition comprised

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of 3.84% solids of Aerosil 380, an amorphous silicon dioxide wherein the resin forming components are greater than 90% of the solids. Thus, the silica is present at most as 4.47% by weight of the resin forming components. This silica is referenced as a thixotrope in col. 3, lines 25, and has a preferred particle size of less than about 1 micron, i.e. less than about 1  $\mu\text{m}$ , and is present most preferably about 1.5 to 5% of the total solids weight of the fill composition of Jones et al. The word "filler" as defined in The American heritage Dictionary, second edition, as "Something added in order to augment weight or size or to fill space." In Kirk-Othmer Encyclopedia of Chemical Technology, Falcone defines a filler as "a finely divided solid added to a liquid, semisolid, or solid composition, e.g. paint, paper, plastics, or elastomers, to modify the composition's properties and reduce its costs." A thixotrope is according to "What You Need to Know About" "additive used to impart thixotropy to a coating material." and thixotropy according to The American Heritage Dictionary of the English language: Fourth Edition, is "the property exhibited by certain gels of becoming fluid when stirred or shaken and returning to the semisolid state upon standing." Thus, the thixotrope of Jones et al is a filler for the epoxy curing systems because it is a finely divided solid added to modify the composition's properties and in "Table 2. Plastic Filler and Their Primary Functions" from Kirk-Othmer Encyclopedia of Chemical Technology, fumed silica is listed as a filler, thus it must also be relatively cheap thus reduce the cost of the composition by acting as filler. Hawkins et al in [0032] when discussing flow control additives also calls them fillers. These "fillers" of Hawkins et al are also inclusive of silica such as fumed silica. As to the average particle diameter of the Aerosil 380, Nakagawa et al in col. 6 states that it is



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The silicic acid anhydride includes a hydrophilic silicic acid anhydride, and a hydrophobic silicic acid anhydride. The hydrophilic silicic acid anhydride has hydroxyl groups on its surface. The hydrophobic silicic acid anhydride has hydroxyl groups on its surface, and about 50% or more of the hydroxyl group are modified, so that the silicic acid has substantial hydrophobic properties. The hydrophilic silicic acid anhydride to be used is usually fine primary particles having a particle size of 0.005 to 0.1  $\mu\text{m}$  which is prepared by the gaseous phase or liquid phase technique. A porous silica gel (particle size: about 1 to 100  $\mu\text{m}$ ) obtained by binding these primary particles through a siloxane linkage three-dimensionally is also used as the silicic acid anhydride. The fine primary particles prepared by the gaseous phase or liquid phase technique include, for example, Aerosil 130, Aerosil 200, Aerosil 300, Aerosil 380 (all manufactured by Nippon Aerosil Co., Ltd.), and the like. The

Thus the average particle size of the Aerosil 380 falls within the range of 0.005, i.e. 5 nm, to 0.1  $\mu\text{m}$  and Yoerger et al, in col. 14, lines 60-63, disclose the primary particle size of about 5 nm.

Barito et al in col. 6, lines 35-40, describe Aerosil 380 as having an average primary particle size of 7 nanometers, i.e. nm and being a fumed silica. The relevant lines are:

35 silica. The Aerosil 380 fumed silica used was produced  
by Degussa Corporation. Aerosil 380 has the the fol-  
lowing distinguishing characteristics: a BET surface  
area of 380 square meters per gram, an average primary  
particle size of 7 nanometers and a tapped density of 50  
40 grams per liter. The two materials (P 820 and Aerosil

Finally, in col. 10, lines 45-59, Ors et al when describing fillers includes fumed silica as one and adds fillers to enhance thixotropic properties. Ors et al is referencing a curable material for forming printed circuit boards so uses the term filler as one of ordinary skill in the art would use the term. Thus, the composition of Jones et al in their Example 1 anticipates the instant invention of claim 1 if it is not limited as discussed above in the issues under 35 USC 112 and the plates formed in Example 1 using this composition anticipate the instant plate of claim 5

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because the amount and nature of Aerosil 380 fits the description of filler in the instant application when considered in the context of filler in the art.

3. Claims 1 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Tazawa et al (4,786,579) as evidenced by Matsuo et al (5,141,822). The printed circuit made and homogeneous resin solution of Tazawa et al anticipates the composition and element of instant claims 1 and 5 wherein the filler present in 5 parts by weight of the 100 parts resin components is silica filler which is Aerosil #200, a product by Nippon Aerosil Co. Matsuo et al in col. 15, lines 51-54, disclosed that Aerosil 200 manufactured by Nippon Aerosil has an average particle diameter of 12 nm. This is within the instant range of 5 nm to 0.5  $\mu$ m and 0.01 to 5 parts by weight per 100 parts by weight of the resin-forming component. The examiner notes that this rejection stands only if "resin-forming component" is broader than set forth page 14 of applicant's specification, but the rejection is made in view of the rejections made above under 35 USC 112, second paragraph.

4. Claims 1, 3 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiroshige et al (WO 99/50369). With respect to instant claims 1, 3 and 5, Hiroshige et al teach all of the instant composition and multilayer circuit board with the exception of the exact weight range and average particle diameter range if the "resin-forming component" is in reference to all resins and not that possibly defined by applicants as discussed above in the 37 USC 112, second paragraph rejection with respect to page 14 of the instant specification:

*"The resin-forming component of a photo- or heat-curable resin composition of this invention consists of the component (A), the component (B), a curing agent and other resin or monomer and the resin-forming component*

*comprises at least one kind of them, preferably the component (A) and another kind, more preferably the component (A), the component (B), and other resin or monomer composed essentially of a trifunctional or higher resin or monomer."*

Because it is not clear that this is a definition in view of the instant claims presented, this rejection over Hiroshige et al is made. Hiroshige et al is drawn to an adhesive for flexible printed circuit boards wherein an inorganic colloid is dispersed therein. The inorganic colloid is present from 1 to 50 % of the adhesive composition and preferably from 2-45% which overlaps the instant range. Two examples are given of the colloid of which one is silica sol. the colloid has an average particle diameter within the range of 1 to 100 nm, i.e. 1 nm to 0.1  $\mu\text{m}$ , which is 5 nm to 0.5  $\mu\text{m}$  from 5 nm to 0.1  $\mu\text{m}$ . In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). With respect to instant claims 1,3 and 5, the choice of one of 2 colloids of Hiroshige et al used within the range of average particle size and percentage of colloid that overlaps that of the instant invention would have been prima facie obvious. Hiroshige et al teaches at the bottom of page 4 that below 1% colloid the dimensional stability of the adhesive is likely to be lowered. Applicants on page 15 in the first full paragraph teach also that if the filler is used in less than 0.01 part a "weak reinforcing effect occurs". Their reasoning for limiting the upper amount is it "deteriorates the properties such as reliability of the resin composition. Applicants made no showing with the resins of Hiroshige et al to show this deterioration. The examiner holds that the 'dimensional stability' of Hiroshige et al is the same force as the "reinforcing effect" of applicants. Thus, the lower limit in both seems to be for the same reason. Generally, differences

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in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical.

“[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation.” *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). Applicants make no showing with resins like those of Hiroshige et al to show the failure of "reliability of the resin composition". In *Hiroshige et al*, see particularly page 1, lines 9-page 2, line 11, line 26-31, paragraph bridging pages 4-5, page 6, lines 4-24, page 8, lines 17-30, page 10, claims 16-19.

5. Claims 1 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Varnell (5,217,847). The solder mask composition of Varnell teach the instant compositions and multilayered circuit boards with the exception of exact range of filler present and average particle diameter of filler. However, in col. 3, lines 32-38, Varnell teach the use of a finely divided filler such as aluminum oxide, silicon dioxide, talcum, mica or kaolin in from about 5% to about 15% by weight based on the nonsolvent components of the composition with the average particle size of the filler being generally less than 0.3 micron. All the fillers listed by Varnell are inorganic. The average particle size in the instant claims is in the rang of 5 nm to 0.5  $\mu$ m and the range is from 0.1 to 5 parts filler to 100 parts resin-forming component. If the nonsolvent components of Varnell are taken as the resin-forming component then at about 5% the compositions of Varnell overlap those of applicants. . In the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists. In *re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In *re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). Thus, with respect to instant claims 1 and 5, wherein the

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compositions of Varnell overlap those of the instant application the use of filler would have been prima facie obvious to form a UV curable solder mask composition.

6. Claims 1-2 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Kushi et al (4,970,135). Example 14 of Kushi et al anticipates the multilayer plates and compositions of instant claims 1-2 and 5 wherein antimony trioxide at .04 g and average particle diameter of 0.02  $\mu\text{m}$ . The reaction product of bisphenol A diglycidyl ether/acrylic acid/maleic anhydride is the instant A.

7. Claims 1 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Lien et al (EP 717318 A1) as evidenced by Glinka et al (Applied Physics). The composition of Example 1 of Lien et al anticipates the instant composition and its use in printed circuit boards as set forth on page anticipates the boards of instant claim 5 as evidenced by Glinka in the second column of page 778 wherein Cabosil eh-5 is identified as  $D=7\text{nm}$ , i.e. nominal particle size.

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Rath et al (5,700,607) teach using bisphenol epoxy acrylates in photoresists with up to 4 % filler, e.g. fumed silica, clay or micro talc, but there is no anhydride reacted with the hydroxyl groups of said acrylates. See col. 7-9 in Rath et al. There are anhydrides present that might react with the hydroxy groups forming resins like instant A as reactive intermediates to the final cured layers but this is not clear from the disclosure. AEROSIL 380 data sheet undated from Degussa AG disclosed to have an average primary particle size of 7 nm. Kirk-Othmer Encyclopedia of Chemical Technology, "Silica, Amorphous Silica, 5. Silica Sols and colloidal Silica" under Wadell disclose that colloidal silica or silica sol is made up of particles of diameters of 1 to 100 nm.

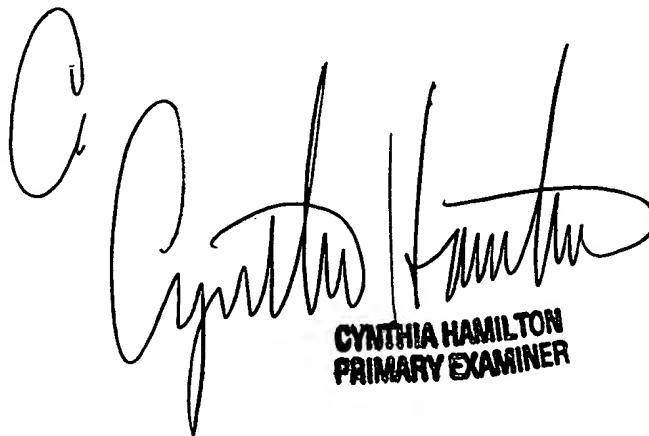
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*Any inquiry concerning this communication or earlier communications from the examiner should be directed to Primary Examiner Cynthia Hamilton whose telephone number is (703) 308-3626. The examiner can normally be reached on Monday-Friday, 9:30 am to 5:00 pm.*

*If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Janet Baxter can be reached on (703) 308-2303. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.*

*Any inquiry of a general nature or relating to the status of this application should be directed to the 1700 receptionist whose telephone number is (703) 308-0661.*

Cynthia Hamilton  
June 27, 2003



**CYNTHIA HAMILTON  
PRIMARY EXAMINER**